30752
S/141/61/004/003/002/020
E133/E435

the actual figures they have derived, owing to the lack of experimental data. They emphasize, in particular, that their results will be modified by the fact that the inhomogeneities are known not to be strictly radial. There are 3 figures, 2 tables and 10 references: 7 Soviet and 3 non-Soviet. The references to three English language publications read as follows:
Ref.4: J.Hewish, Proc. Roy. Soc., 228, 239 (1955).
Ref.7: J.Hewish, Paris Symposium on Radio Astronomy, Stanford Univ. Press, 1959;
Ref.8: V.V.Vitkevitch, Paris Symposium on Radio Astronomy, Stanford Univ. Press 1959.

4

ASSOCIATION: Fizicheskiy institut im. P.N.Lebedeva AN SSSR
(Physics Institute imeni P.N.Lebedev AS USSR)

SUBMITTED: August 26, 1960

Card 4/4

3,1750
6,4320

28518
S/109/61/006/009/001/018
D201/D302

AUTHORS: Vitkevich, V.V., Kuz'min, A.D., Matveyenko, L.I., Sorochenko, R.L., and Udal'tsov, V.A.

TITLE: Radioastronomical observations of Soviet- cosmic rockets

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 9, 1961, 1420 - 1431

TEXT: This is a description of a specially designed radio interferometer with phase modulation, as used in tracking the first three Soviet space rockets. The principle of a two channel phase divergent reception was used to detect changes in the signal amplitude, due to relative changes of the position of transmitter with respect to the lobe of interference diagram. In receiving a signal with continuous spectrum the fluctuation sensitivity in units of temperature (T_a) of the antenna is given by the well known equation

Card 1/7

Radioastronomical observations ...

$$\delta T_a = a_1 T_o F_e \sqrt{\frac{1}{\Delta f \tau}}, \qquad (7)$$

where a_1 - a dimensionless factor depending on the properties of the receiver, T_o - standard ambient temperature; $F_e = (T_a + T_{in})/T_o$ - the equivalent input temperature determined by noise of the receiver; $T_{in} = (F_r - 1)$; F_r - noise factor of the receiver; T_a - antenna temperature; τ - time constant of the output cct; Δf - passband between input and detector. The bloc diagram of the receiver is shown; the operating frequency was 183.6 Mc/s, that of the transmitter in the rocket capsule. The interferometer had two parabolic antennae 8 x 16 and 11 x 28 m, spaced in the E-W direction by approximately 176 m. Total length of both antennae was 8 m. The antennae were reilluminated from their focal points by specially designed radiating systems, assuring best possible illumination for two linear polarizations perpendicular with respect to each other. Yu.P. Ilyasov participated in their design. A schematic of the

Card 2/7

Radioastronomical observations ...

illuminating system is also shown, the three resonant dipoles were connected by equal lengths of a PK-20 (RK-20) cable to a common feeder. The directional patterns and utilization factors of the antenna areas were determined from solar radiation. For both antennae, the area utilization factor was about 0.5. Phase modulation at a frequency 72 c/s was achieved by changing the phase by 180° by means of periodical variation of the electric length of the wall connecting the local oscillator with one of the mixers, so that the received signal was amplitude modulated at this frequency. The phase modulator was designed around a standard hybrid switch. The switching elements were light house diodes type 6Д3Д (6D3D) driven by the sinusoidal modulating voltage. The attenuation introduced did not exceed 2 db. The change in the diode slopes by way of changing the bias and the insertion of the modulator into the local oscillator circuit permitted the parasitic amplitude modulation of earlier systems to be reduced considerably. The modulator used permitted the radio meter with phase modulation to be changed into that with AM, this was achieved by suppressing the modulating voltage at one of the diodes. The signals were preamplified at UHF by amplifiers

Card 3/7

Radioastronomical observations ...

placed directly at the antennae. The noise factor of UNF preamplifiers was 5. The amplified signals from each antenna were changed after buffer stages to the 1st IF of 6.95 Mc/s and fed into two channels with a 90° phase shift between them. A double frequency conversion was used. The 190.554 mc/s frequency of the first local oscillator was produced by a thermostatically controlled crystal oscillator working at 9.074 mc/s with subsequent multiplication by 21. Its relative instability was 10^{-6} and hence the passband of a monochromatic signal was chosen to be 2Kc/s. To secure reception with the signal frequency shifting due to the Doppler effect, step tuning within 8 Kc/s was provided formed by 5 resonant circuits detuned in 2 Kc/s steps. On top of the first L.O. could be continuously tuned within ± 3.2 Kc/s. For calibration purposes, when a under-pass band is required, the second amplifier pass band could be switched from 2 to 10 Kc/s without affecting tuning and gain. The signal, detected by a synchronous detector, was taken from an RC output filter with time constant τ = 26 sec. This value permits achieving the required fluctuation sensitivity and in practive does not affect the interference amplitude. All power sup-

Card 4/7

plies were stabilized with a stabilization factor of about 10^3. The signals were recorded on electronic automatic recorders type ЭПП-9 (EPP-09) monitored by one minute time markers. The experimental data of the receiver sensitivity are tabulated. The experimental sensitivity was about half that calculated from Eq. (7). The maximum sensitivity of the interferometer, corresponding to the minimum detected power levels, are also tabulated. In making final adjustments (M.V. Gorelova participated in the final adjustment method evaluation) constant and timevarying parameters had to be considered. The constant parameters are γ - angle between the horizontal plane and the projection of the base onto a vertical east-west plane, θ - angle between the east-west direction and projection of the base onto a horizontal plane and D - base of the interferometer distance between the antennae are determined by fixed antenna geometry: $\eta = \varphi_n/\lambda$ on the other hand is determined by electrical lengths of the cables and phase characteristics of input stages and can vary with time. A geodesical survey gave the following results: D = 175.896 m; $\gamma = 2°44'$; $\theta = -14'$ so that the expression

Card 5/7

Radioastronomical observations ...

for the azimuth of the source is given by

$$A = 179^{\circ}46' + \arcsin\left[\frac{0.0093006}{\sin z}(n - \eta) - 0.047669 \operatorname{ctg} z\right], \quad (10)$$

where n - is the number of the lobe and z - the zenith angle of the source. The parameter η was determined from

$$\eta = \frac{t_r - t_{\Lambda\,\text{source}}}{T}, \quad (11)$$

where T - the period of the interference lobe, t_r - the calculated and $t_{\Lambda\,\text{source}}$ - the real instant at which the source passes through the maximum of the interference diagram. Owing to the finite value of the output cct time constant, the instant $t_{\Lambda\,\text{source}}$ at which the source crosses the maximum of the diagram does not correspond with t representing the maximum deflection of the seconding instru-

Card 6/7

Radioastronomical observations ...

ment. $\Delta\tau$ thus was introduced, as given by

$$\Delta\tau = t_{\Lambda} - t_{\Lambda source} = \tau\left[1 - \frac{4}{3}\left(\frac{\tau}{T}\right)^2\right] \qquad (12)$$

in adjusting the arrangement. The above instrument and method of observations were applied to tracking the first, second and third Soviet- space rockets, launched January 2, September 12, and October 4, 1959, respectively; measuring their angular coordinates and measurements of the intensity of the received signal were also carried out. There are 8 figures, 3 tables and 11 references: 5 Soviet-bloc and 6 non-Soviet-bloc. The references to the 4 most recent English-language publications read as follows: G. Fielder, Nature, 1960, 185, 4705, 11; H.P. Wilkins, Nature, 1959, 184, 4685, 502; P. Moore, Nature, 1959, 184, 4085, 502; J.G. Davies, A.G.B. Lovell, Nature, 1959, 194, 4685, 501.

ASSOCIATION: Fizicheskiy institut im. P.N. Lebedeva AN SSSR (Institute of Physics im. P.N. Lebedev, AS USSR)

SUBMITTED: October 4, 1960

Card 7/7

VITKEVICH, V.V.

Radio astronomy at the 14th assembly of the U.R.S.I. Astron. zhur. 41 no.3:592-594 My-Je '64. (MIRA 17:6)

VITKEVICH, V.V.

Soviet-American symposium on radio astronomy. Astron.zhur. 38 no.6:1120-1129 N-D '61. (MIRA 14:11)
(Radio astronomy--Congresses)

S/141/62/005/002/021/025
E032/E414

3,1800

AUTHOR: Vitkevich, V.V.

TITLE: Disturbances in the regular structure of the magnetic field in the solar supercorona

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Radiofizika. v.5, no.2, 1962, 402-403

TEXT: Eclipse measurements by the author have indicated that the direction of the magnetic field in the supercorona is frequently almost radial, whereas measurements carried out by I. Hewish have shown that the direction of the magnetic field is often at 90° to the radial direction. It is now suggested that although the magnetic field is in fact approximately radial, the appearance of an elongated plasma cloud in the supercorona, which lies along the path traversed by the radio waves and is nearer to the Earth than the scattering regions, is responsible for the refraction of the waves, and the latter is very different for different regions of the Crab nebula. As a result there is an effective rotation in the major axis of the Crab nebula ellipse.

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In order to confirm this interpretation, it will be necessary to observe the supercorona not only during the culmination but continuously for five to seven hours per day. There is 1 figure.

ASSOCIATION: Fizicheskiy institut im. P.N.Lebedeva AN SSSR
(Physics Institute imeni P.N.Lebedev AS USSR)

SUBMITTED: October 7, 1961

3,1550
3,1720

S/141/62/005/002/022/025
E140/E435

AUTHOR: Vitkevich, V.V.

TITLE: The possible existence of natural radio plasma-satellites moving about the sun

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Radiofizika. v.5, no.2, 1962, 404-405

TEXT: Various observations, in particular those at the Krymskaya radioastronomicheskaya stantsiya (Crimean Radio-astronomical Station) and Serpukhovskaya radioastronomicheskaya stantsiya (Serpukhov Radioastronomical Station) of FIAN, indicate the presence of moving masses of plasma in the corona, with velocities of the order of hundreds or thousands of km/sec. In June 1960, observations on three radiointerferometers at 6 and 1.5 m (data, processed by L.I.Matveyenko and V.I.Slysha, still to be published) show the presence of a radio source moving rapidly across the solar disc. The emitter moved approximately parallel to the equator from the left-hand to the right-hand edge of the disc. At the extremities of the trajectory the apparent height was about

Card 1/2

The possible existence ...

one solar radius. These and other observations indicate the probable existence of radiating plasma bunches in the Sun's vicinity. The author calculates the orbital durations and lifetimes of the corresponding objects. Since the probabilities of observing such objects are quite low, prolonged observations are necessary using 2 or preferably 3 radiointerferometers. It is difficult at present to decide between 6 and 1.5 m as the most suitable wavelengths for these observations. Should such installations be located beyond the Arctic or Antarctic circles, continuous observations would be possible over many months. Finally, the possibility of a radiating ring about the sun, arising in the disintegration of a large plasma satellite, is mentioned. There is 1 table.

ASSOCIATION: Fizicheskiy institut im. P.N.Lebedeva AN SSSR
(Physics Institute imeni P.N.Lebedev AS USSR)

SUBMITTED: October 7, 1961

Card 2/2

39538
S/033/62/039/004/004/008
E032/E514

3.1.120

AUTHORS: Alekseyev, Yu.I., Babiy, V.I., Vitkevich, V.V., Gorelova, M.V. and Sukhovey, A.G.

TITLE: Observations of solar radio-emission in the metre range during the total solar eclipse of February 15, 1961

PERIODICAL: Astronomicheskiy zhurnal, v.39, no.4, 1962, 643-652

TEXT: The observations were carried out at the Krymskaya nauchnaya stantsiya laboratorii radioastronomii FIAN (Crimean Scientific Station of the Radioastronomical Laboratory of FIAN) using the multichannel radiospectrograph described earlier (V.V.Vitkevich, Z.I.Kameneva, D.V.Kovalevskiy, Radiotekhnika i elektronika, 1, No.6, 864, 1956; V.V.Vitkevich, Tr.5 soveshchaniya po voprosam kosmogonii 9-12 marta 1955 g., Radioastronomiya, Izd-vo AN SSSR, 1956, p.14). Various improvements have recently been introduced into this spectrograph and its wavelength range extended. The working range is 40-150 Mc/sec. There are sixteen channels and the sensitivity in each channel is 10^{-22} W/m^2 cps. Detailed results are now reproduced in the form

Card 1/2

of graphs for the 1.5-4 m range. Analysis of the results is used to determine the radio diameter of the sun which is found to be:

$$D_p = 0.035\lambda^2 - 0.035\lambda + 1.28,$$

where λ is in metres and D_p is in units of the optical diameter of the sun. Fig.9 shows the dependence of the intensity of solar radiation on wavelength. The computed effective radio temperature turned out to be practically the same for all wavelengths (7.5×10^5 °K). There are 9 figures and 1 table.

ASSOCIATION: Fizicheskiy in-t im. P.N.Lebedeva Akademii nauk SSSR
(Physics Institute imeni P.N.Lebedev, AS USSR)

SUBMITTED: September 6, 1961

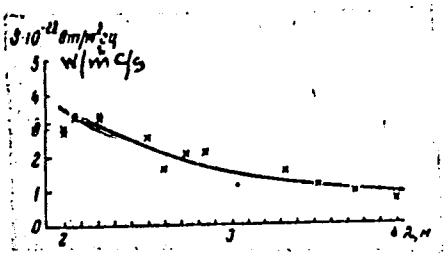


Fig.9

BABIY, V.I.; VITKEVICH, V.V.

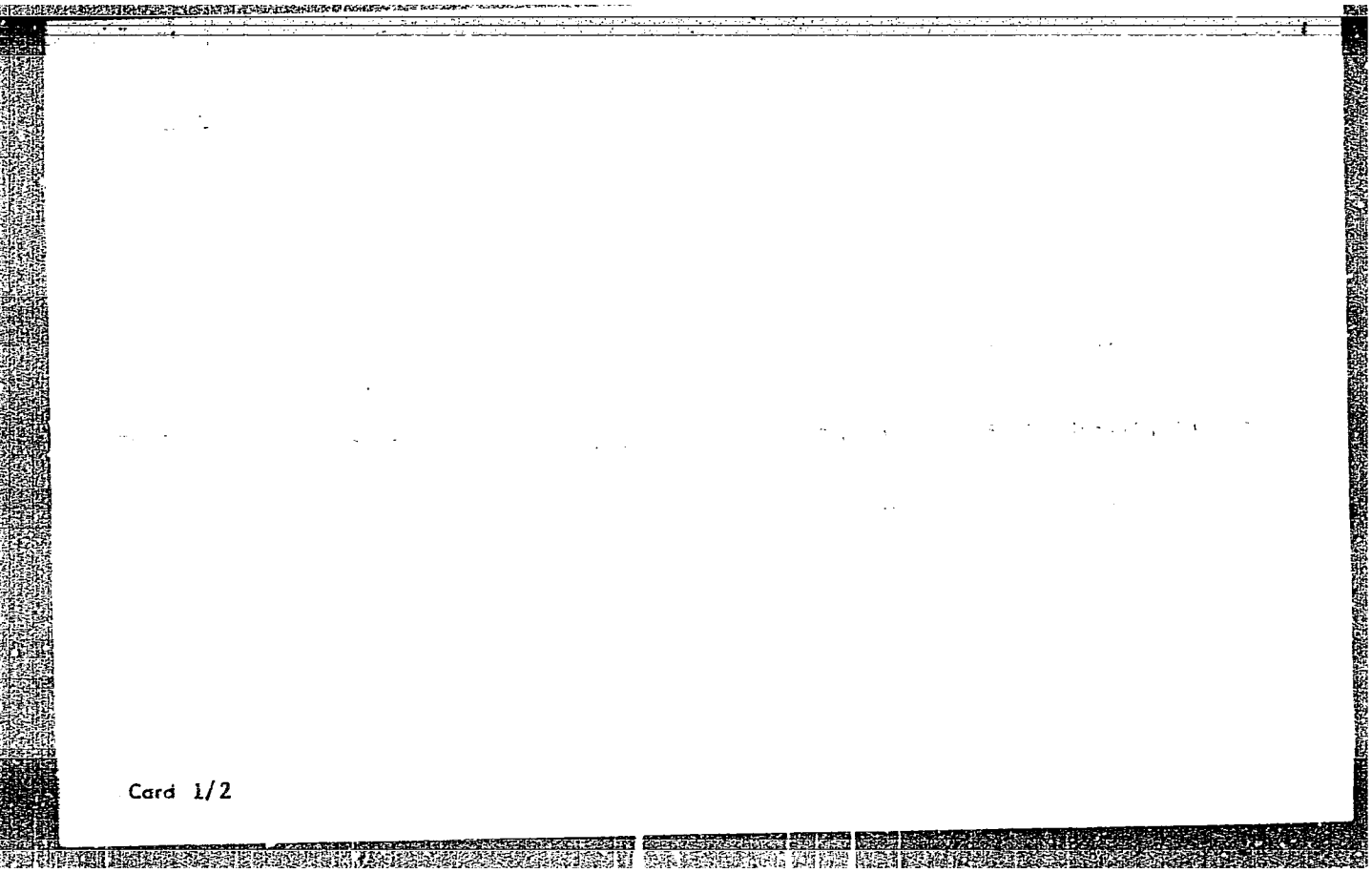
Radio interferometer with frequency multiplication. Radiotekh. i elektron. 9 no.6:960-965 Je '64. (MIRA 17:7)

1. Fizicheskiy institut imeni P.N. Lebedeva AN SSSR.

VITKEVICH, V.V.

A two-component model of the solar supercorona. Astron. zhur. 41 no.4:684-691 Jl- Ag '64 (MIRA 17:8)

1. Fizicheskiy institut im. P.N. Lebedeva AN SSSR.



L 52045-65
ACCESSION NR: AT5012800

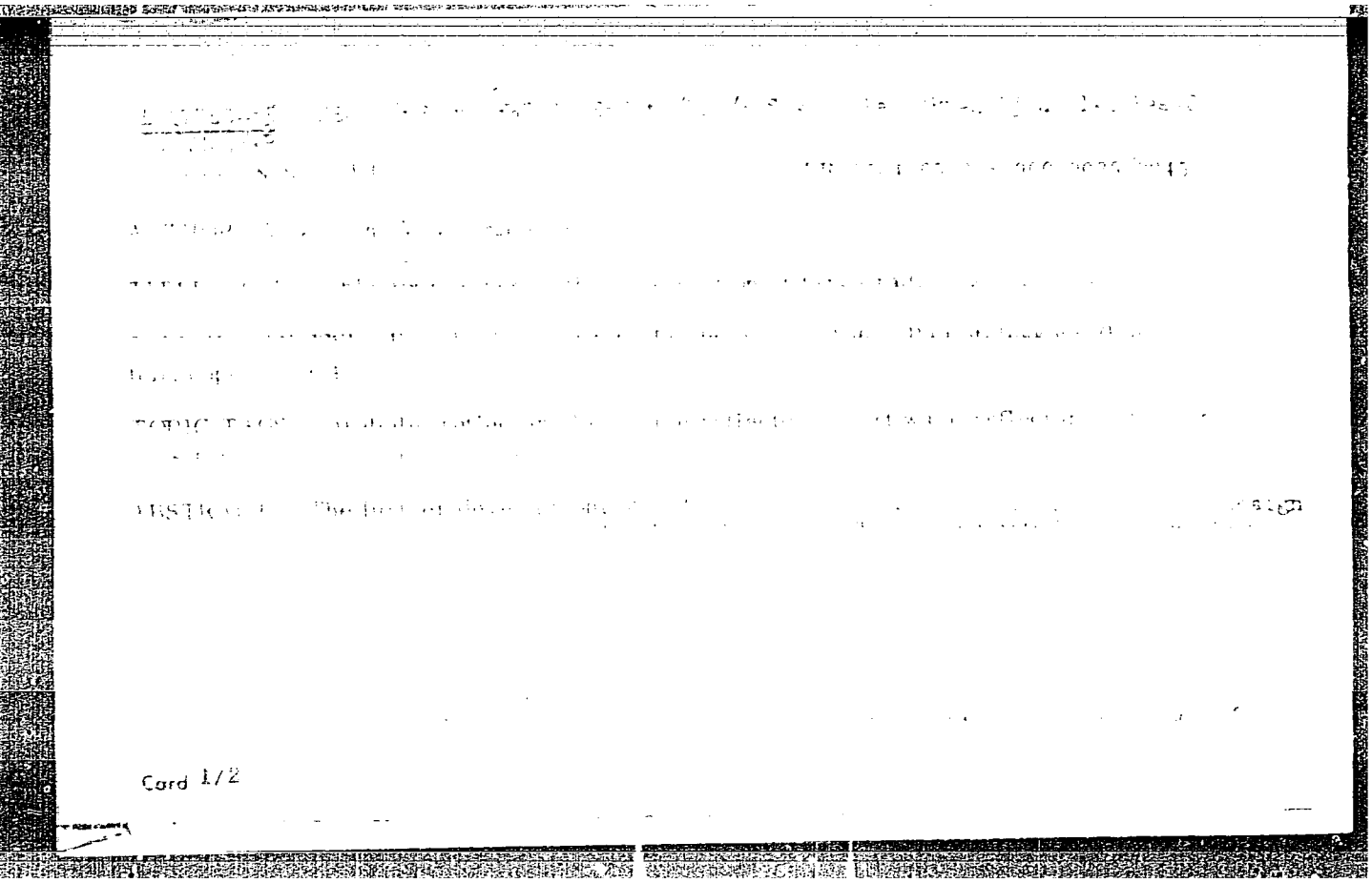
It is now in the adjusting stage. [illegible]

[illegible] items during the design of the radiotelescope while [illegible] was the chief designer." Orig. art. has: 5 figures.

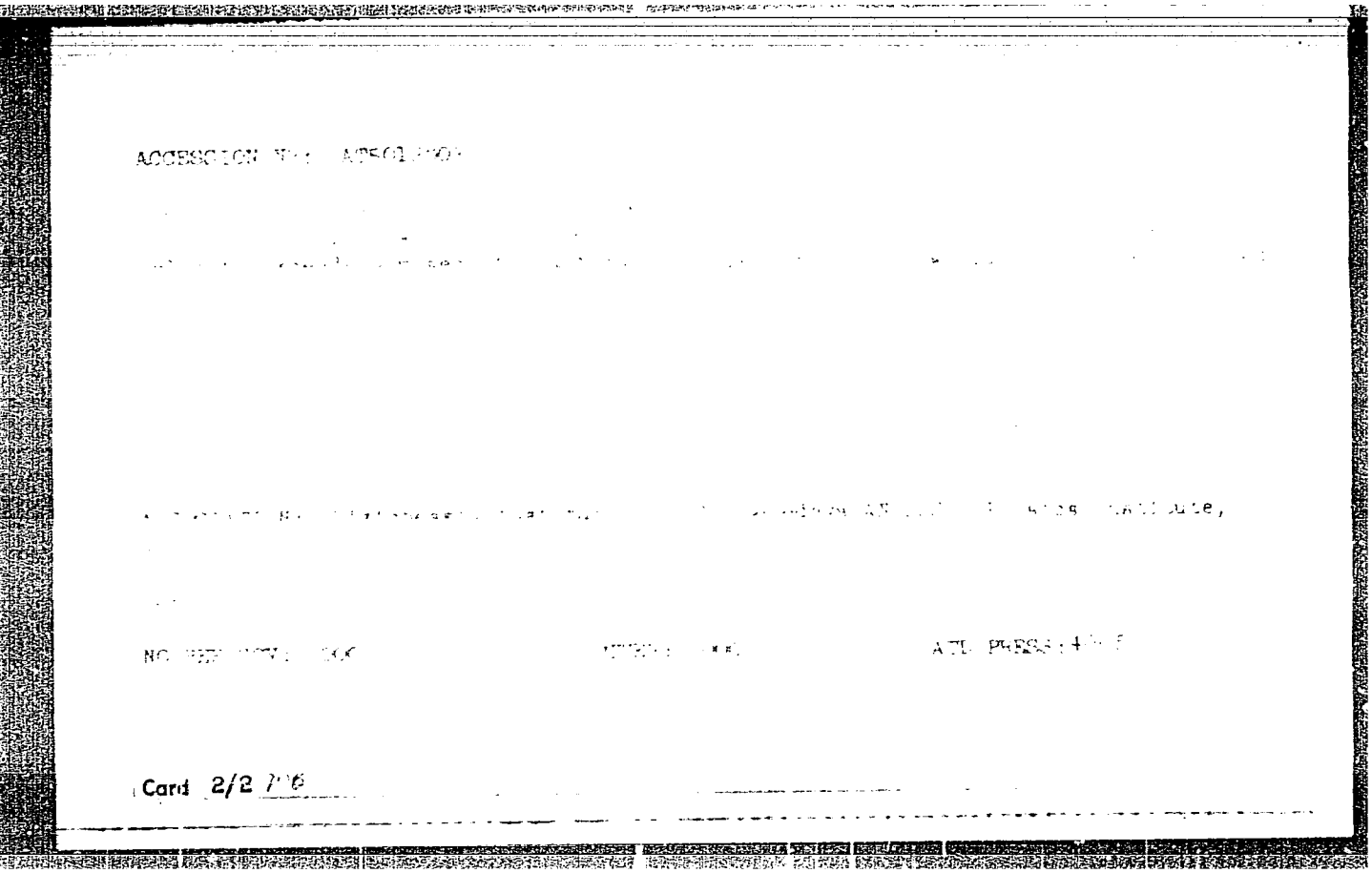
[illegible]

NO REF SOV: 002 OTHER: 001

Card 2/2



Card 1/2



Card 2/2

[illegible] Radio

[illegible] antenna, radiotelescope and [illegible]

[illegible] the first half of this article surveys the theory of parabolic reflectors

L 52042-65
ACCESSION NR: AT5012804

Screens may partially overlap and partially cover the reflector. Their purpose is

Institute of the Academy

SUBMITTED: 00 ENCL: 00 SUB CODE: EC, AA

Card 2/2

ACCESSION NR: AP4040909 S/0109/64/009/006/0960/0965

AUTHOR: Babiy, V. I.; Vitkevich, V. V.

TITLE: Radiointerferometer with frequency multiplication

SOURCE: Radiotekhnika i elektronika, v. 9, no. 6, 1964, 960-965

TOPIC TAGS: radioastronomy, radiointerferometer, Crab Nebula, two antenna radiointerferometer

ABSTRACT: When the signal-to-noise ratio is not very low, the resolution of a radiointerferometer may be raised by frequency multiplication. The gain in the signal-to-noise ratio due to frequency multiplication is theoretically evaluated for the case of a 2-antenna interferometer. An experimental verification was performed with a 2-antenna interferometer having these characteristics: wavelength, 5 m; base, 150 λ oriented east-west; lobe angle, 23',2; stationary-paraboloid antennas had an effective area of 200 m^2 each; quartz-controlled

Card 1/2

ACCESSION NR: AP4040909

heterodyne frequency, 53 mc; first IF, 7 mc; IF multiplication was used. Crab Nebula r-f radiation was recorded. The system is claimed to be suitable for determining the coordinates and size of radio sunspots and flares. Orig. art. has: 3 figures and 6 formulas.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Institute of Physics, AN SSSR)

SUBMITTED: 28Mar63 ENCL: 00

SUB CODE: EC, AA NO REF SOV: 007 OTHER: 003

Card 2/2

VITKEVICH, V.V.

Radio astronomy in Australia. Vest. AN SSSR 33 no.6:77-81 Je '63. (MIRA 16:7)
(Australia--Radio astronomy)

VITKEVICH, V.V.

Radio astronomy in Australia. Astron. zhur. 40 no.3:589-594 My-Je '63. (MIRA 16:6)

(Australia--Radio astronomy)

VITKEVICH, V.V.

Development of radio astronomical studies in the Laboratory for Radio Astronomy at the P.N. Lebedev Physical Institute of the Academy of Sciences of the U.S.S.R. Trudy Fiz. inst. 17:3-12 '62. (MIRA 15:12)

(Radio astronomy)

ARTYUKH, V.S.; VITKEVICH, V.V.; VLASOV, V.I.; KAFAROV, G.A.; MATVEYENKO, L.I.

Distribution of the radio brightness of the Crab nebula on the meter wavelengths derived from observations of lunar occultations on August 4, 1964. Astron. zhur. 43 no. 1:13-19 Ja-F '66 (MIRA 19:2)

1. Fizicheskiy institut imeni P.N. Lebedeva AN SSSR. Submitted April 17, 1965.

L 25979-66 EWT(l) GW/WS-2

ACC NR: AP6015081 SOURCE CODE: UR/0020/66/168/001/0055/0058

AUTHOR: Vitkevich, V. V.; Antonova, T. D.; Vlasov, V. I.

ORG: Institute of Physics im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy institut AN SSSR)

TITLE: Observations of intensity fluctuations in radio emission from the quasi-stellar source 3C-48 caused by heterogeneities of the interplanetary plasma

SOURCE: AN SSSR. Doklady, v. 168, no. 1, 1966, 55-58

TOPIC TAGS: supercorona, quasistellar source, angular distance, fluctuation period, astronomical unit

ABSTRACT: Heterogeneities in the solar supercorona with velocities reaching several thousand km per second were observed at distances of up to 100 solar radii. Using the east-west line of the Radioastronomical Station of the Institute of Physics of the Academy of Sciences SSSR, systematic investigations of the quasi-stellar 3C-48 source were made on the 3.5-m wavelength. In February, the source approached the sun. In March, fluctuations in the brightness of the source began. Fluctuations increased with the decrease in angular distance between the source and the sun, attaining the maximum in April and May when the minimum angular distance occurred. A table in the original article and a histogram show the rate of fluctuations of the source. The mean period of fluctuations was 3 and 4 seconds. A weak second period

Card 1/2 UDC: 523.164.4+523.152.3

L 25979-66

ACC NR: AP6015081

of 6 and 7 seconds may be identified. This is related to the 3.5-m wavelength. An attempt to continue the investigation on the 7.9-m wavelength was unsuccessful. The area of scattered light at a distance of one astronomical unit with a diameter of 500—1000 km is seen at an angle of 0.7"—1.4". The effective angular diameter of the source was accepted as equal to 0.1". Orig. art. has: 2 figures, 1 table, and 1 formula. [EG]

SUB CODE: 03/ SUBM DATE: 21Jul65/ ORIG REF: 006/ OTH REF: 005/ ATD PRESS: 4256

Card 2/2 FW

L 36204-66 EWT(d)/FSS-2/EWT(1)/FCC RB/GW
ACC NR: AP6011442 SOURCE CODE: UR/0109/66/011/004/0623/0626

AUTHOR: Vitkevich, V. V.

ORG: none

TITLE: Dispersion of radio waves in the interplanetary plasma

SOURCE: Radiotekhnika i elektronika, v. 11, no. 4, 1966, 623-626

TOPIC TAGS: interplanetary space, radio wave

ABSTRACT: The angle of dispersion of radio waves in the interplanetary plasma is evaluated in the ecliptic plane along various directions from the Earth; the evaluation is based on Soviet and Western experimental data. The dispersion by isotropic and radial inhomogeneities is considered. A numerical example indicates the possibility of observations designed to detect predicted dispersion maxima. At a 10-m wave, the radio-interferometer base will be about 30 km; at

Card 1/2 UDC: 621.371.18

L 36204-66
ACC NR: AP6011442

a 15-m wave and the same base, the observations promise to be more efficient. With prolate radial inhomogeneities, the dispersion angle is expected to increase in the direction of prolateness. This effect should be particularly pronounced when radio waves are dispersed by corpuscular streams. Orig. art. has: 2 figures, 12 formulas, and 1 table.

SUB CODE: 03, 17 / SUBM DATE: 13Jan65 / ORIG REF: 006 / OTH REF: 002

Card 2/2 *elb*

L 06221-67 EWT(1) GW

ACC NR: AP6028349 SOURCE CODE: UR/0203/66/006/004/0650/0657

AUTHORS: Vitkevich, V. V.; Lotova, N. A.

ORG: Physics Institute im. P. N. Lebedev AN SSSR (Fizicheskiy institut AN SSSR)

TITLE: Radio wave scattering by isotropic and radially elongated heterogeneities of a solar supercorona

SOURCE: Geomagnetizm i aeronomiya, v. 6, no. 4, 1966, 650-657

TOPIC TAGS: solar corona, radio wave scattering, electron density, solar activity, solar magnetic field

ABSTRACT: Experimental data on radio wave scattering in a solar supercorona are used to distinguish two components of electron-density heterogeneities. Formulas are derived for the scattering angles of a spherical wave in two components. The scattering functions for the radially elongated and isotropic components, respectively, are:

$$\psi_1^2(r, m_1) = \frac{k_1^2(2m_1 - 1)\Gamma(m_1)}{2\sqrt{\pi}\,\Gamma\left(m_1 + \frac{1}{2}\right) r^{2m_1+1}}$$

and

$$\psi_2^2(r, m_2) = \frac{k_2^2 m_2 \Gamma\left(m_2 + \frac{1}{2}\right)}{\sqrt{\pi}\,\Gamma(m_2 + 1) r^{2m_2+1}}.$$

UDC: 523.75

Card

Here $\Gamma(m)$ is a gamma function; $\psi(r)$ the scattering function, which is expressed as

$$\psi(r) = 4{,}5 \cdot 10^{-10} \sqrt{\pi} \lambda^2 \frac{N_e(r)}{\sqrt{q(r) l(r)}},$$

where λ is the wavelength in meters; N_e the electron concentration in the heterogeneities; q the spacing of the heterogeneities (or the space factor); and l the characteristic dimension of the heterogeneities. The scattering of spherical radio waves by isotropic and radially elongated heterogeneities for various positions of a point source is examined. It is found that a point radio source in a solar supercorona has the shape of an ellipse due to scattering. The semimajor axis is perpendicular to the direction to the sun, and the eccentricity is a function of the coordinates of the source (see Fig. 1). A method of calculating the attenuation factors for various source positions is given in the appendix.

L 21481-66 EWT(1)/FBD GW/WS-2

ACC NR: AP6006769 SOURCE CODE: UR/0033/66/043/001/0013/0019

42
40
B

AUTHORS: Artyukh, V. S.; Vitkevich, V. V.; Vlasov, V. I.; Kafarov, G. A.; Matveyenko, L. I.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy in-t Akademii nauk SSSR)

TITLE: On the radio brightness distribution of the Crab Nebula in the meter wavelength region from observations of the lunar occultation of 4 August 1964

SOURCE: Astronomicheskiy zhurnal, v. 43, no. 1, 1966, 13-19

TOPIC TAGS: radio astronomy, radio emission, cosmic radio source, nebula

ABSTRACT: Results are presented of observations of the Crab Nebula during the lunar occultation of 4 August 1964 at wavelengths of 1.4, 5.0, and 7.5 m. The occultation was close to central, and the first phase occurred near culmination. The interference method was used for observation to eliminate background effects. The antenna types used, their distribution, and other details of the radio interferometers are discussed. Since the antennas were fixed, only the first two contacts of the occultation were observed. The observed interference signals

Card 1/2 UDC: 523.164

L 21481-66
ACC NR: AP6006769

are shown, and the methods of interpretation and the occultation curves are presented. The derived brightness distribution curves of the Crab Nebula in the direction of the lunar motion (close to the direction of right ascension) are given. The right ascension of the centroid of the radio emission at 7.5 m with respect to the double star is 0"±10", while that at 1.4 and 5.0 m is shifted toward the western boundary of the nebula by 15"±7". Several bright regions were detected and their intensities, spectral indices, and dimensions are given. These results were obtained by comparing the present observations with those of the lunar occultation of 16 April 1964 at 1.4 m in which the lunar motion was directed approximately along the minor axis of the nebula. The authors thank R. D. Dagkesamanskiy for help in the observations and I. M. Dagkesamanskaya for calculating the topocentric coordinates of the Moon, the spatial frequency spectrum, and its variation during occultation. Orig. art. has: 2 formulas, 2 tables, and 6 figures. [04]

SUB CODE: 03/ SUBM DATE: 17Apr65/ ORIG REF: 004/ OTH REF: 007/ ATD PRESS: 4218

Card 2/2 PB

BABIY, V.I.; VITKEVICH, V.V.; VIASOV, V.I.; GORELOVA, M.V.; SUKHOVEY, A.G.

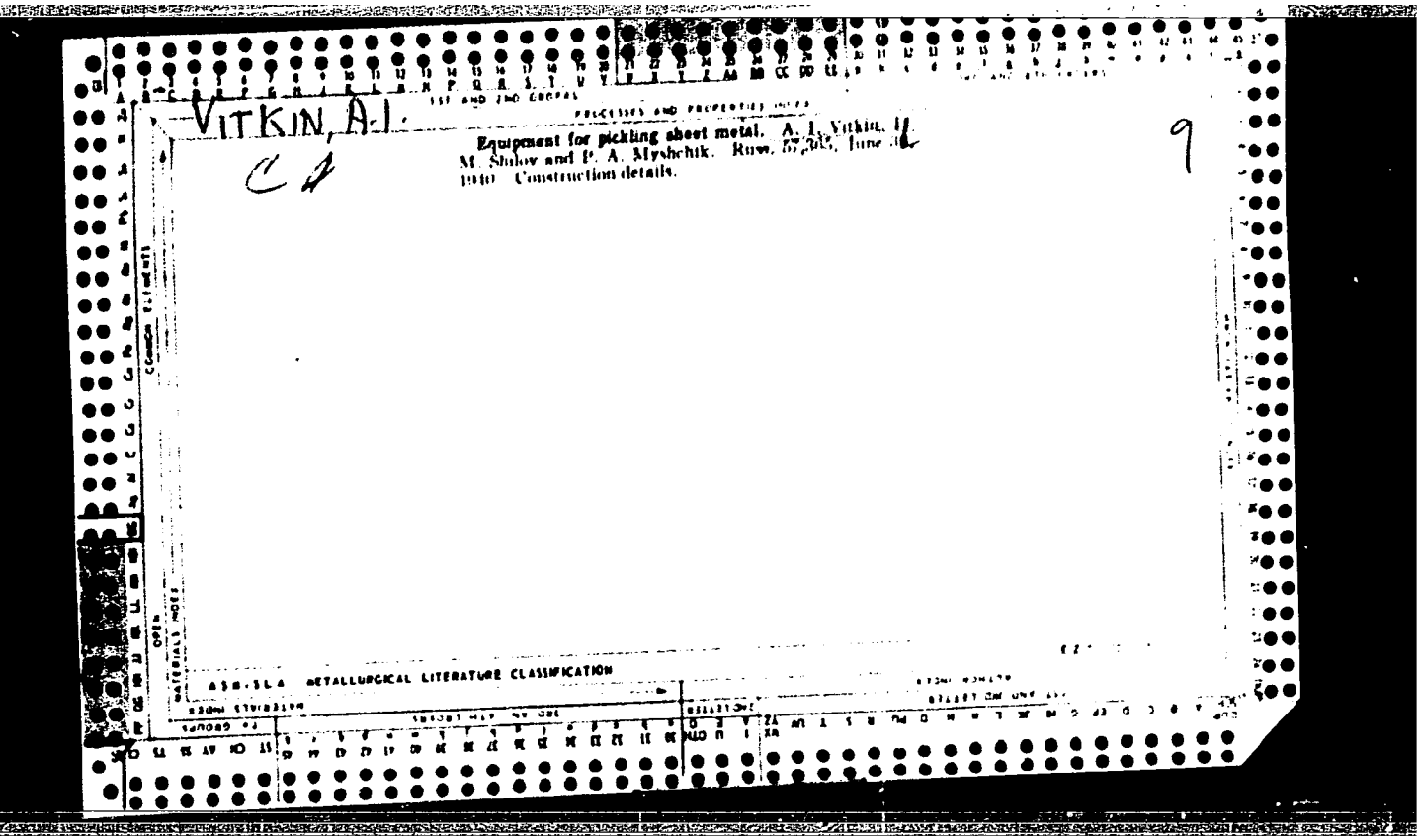
The solar supercorona from observations made during 1959-1963.
Astron. zhur. 42 no.1:107-116 Ja-F '65. (MIRA 18:2)

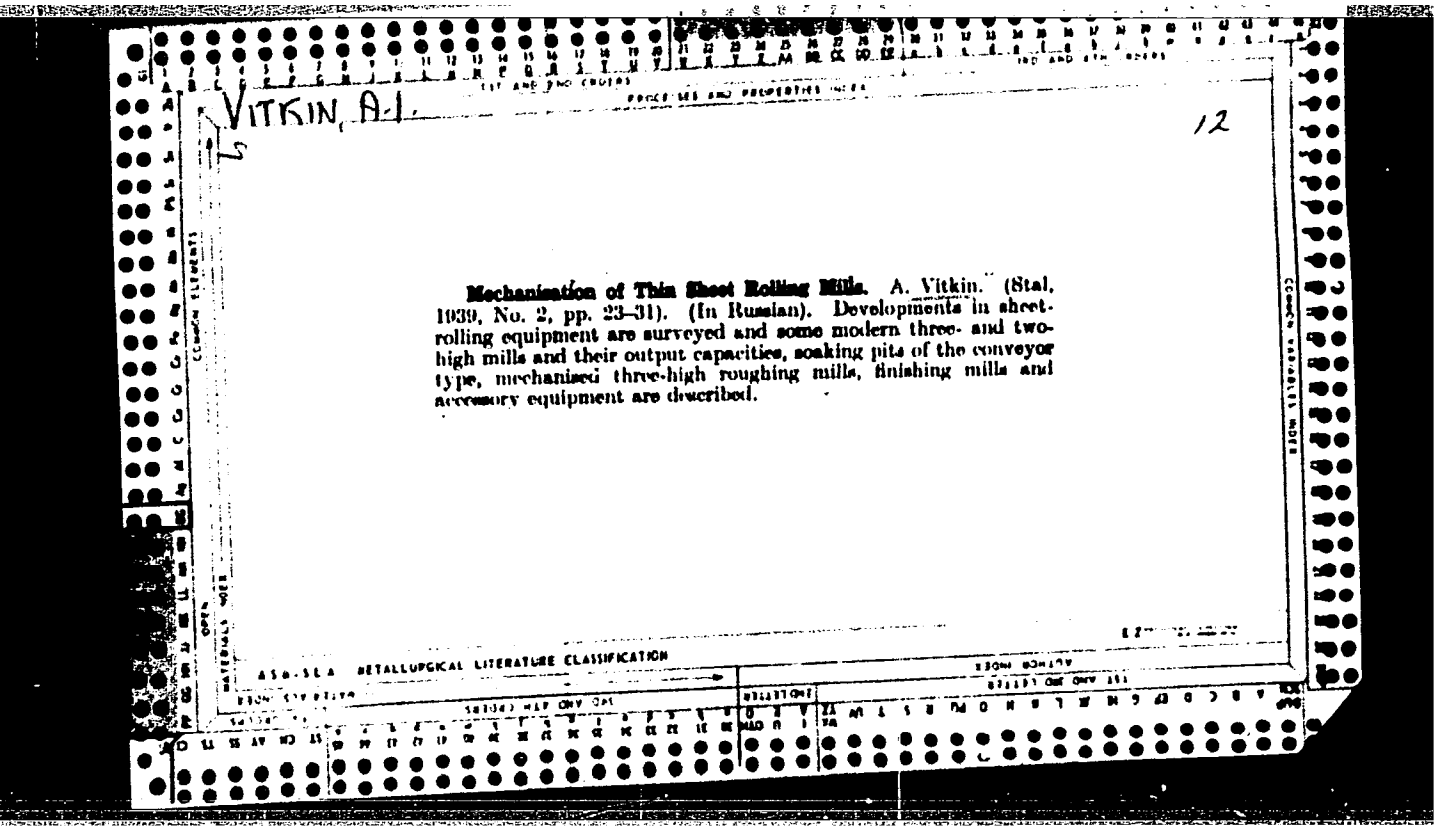
1. Fizicheskiy institut im. P.N. Lebedeva AN SSSR.

VITKIN, A.I., doktor tekhn.nauk; PARAMONOV, V.A., inzh.; GUSEVA, S.S., inzh.

Combining technological processes of sheet steel production in one continuous line. Stor. trud. TSNIICHM no.28:35-39 '62. (MIRA 15:11)

(Rolling (Metalwork)) (Assembly line methods)



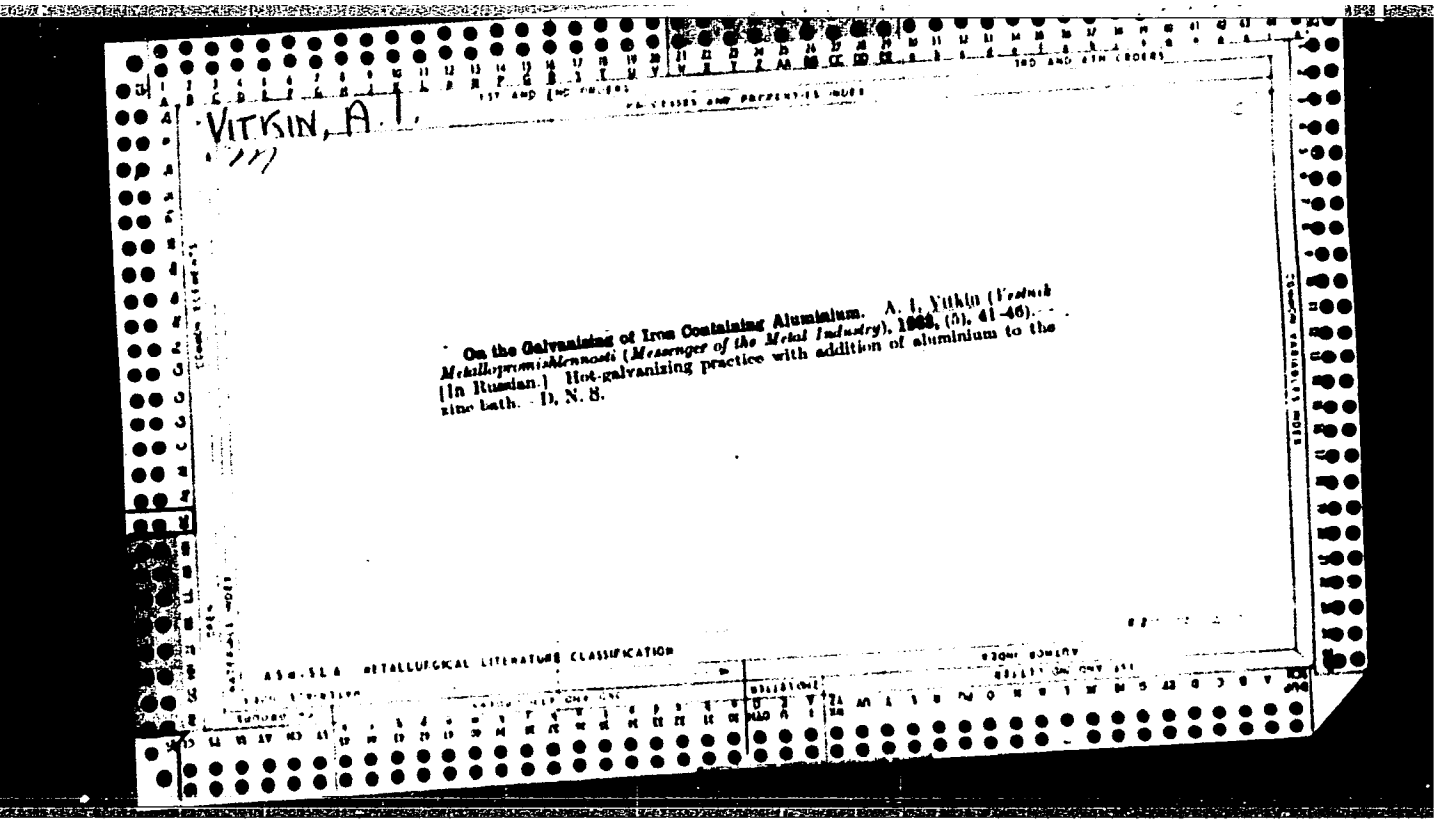


VITKIN, A.I.

12

Mechanization of Thin Sheet Rolling Mills. A. Vitkin. (Stal, 1939, No. 2, pp. 23–31). (In Russian). Developments in sheet-rolling equipment are surveyed and some modern three- and two-high mills and their output capacities, soaking pits of the conveyor type, mechanised three-high roughing mills, finishing mills and accessory equipment are described.

ASS-SEA METALLURGICAL LITERATURE CLASSIFICATION



VITKIN, A. I.

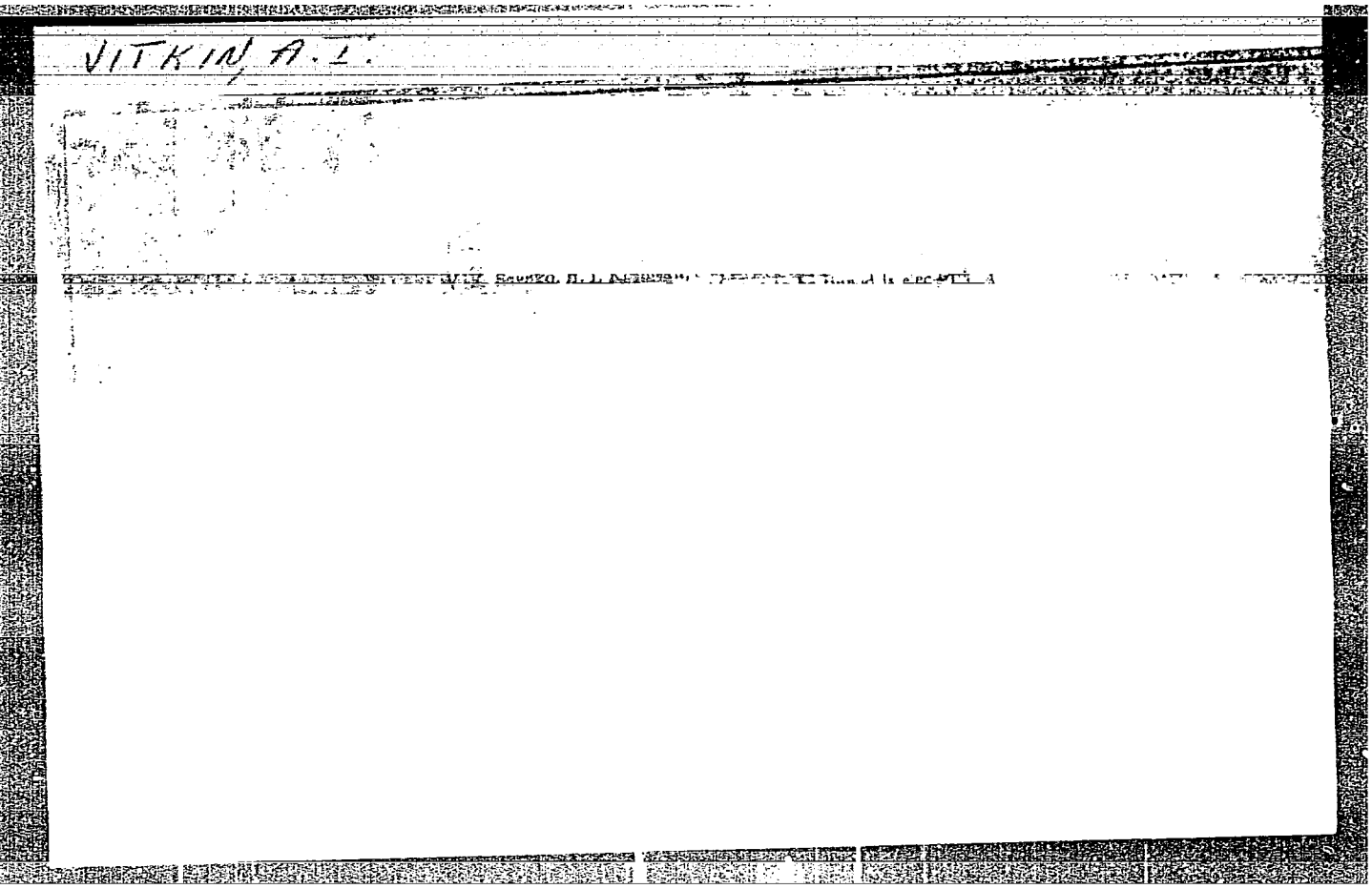
111

On the Galvanizing of Iron Containing Aluminium. A. I. Vitkin (*Vestnik Metallopromishlennosti* (*Messenger of the Metal Industry*), 1938, (5), 41–46). [In Russian.] Hot-galvanizing practice with addition of aluminium to the zinc bath. D. N. S.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

VITKIN, A.I., kand.tekhn.nauk

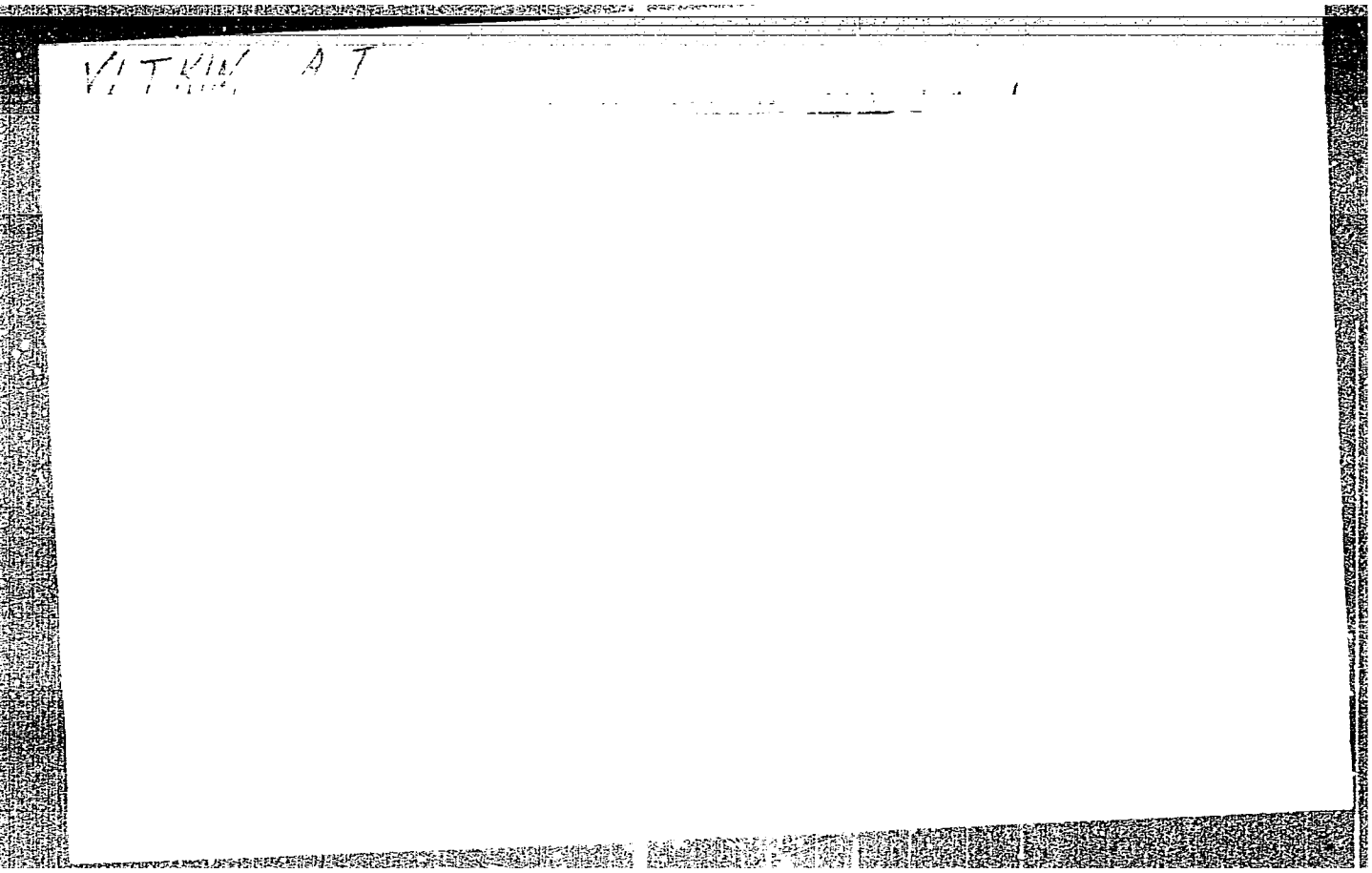
Irregularity of deformation in pack rolling of thin sheets. (MIRA 12:10)
Obr.met.davl. no.2:56-75 '53.
(Rolling (Metalwork)) (Deformations (Mechanics))

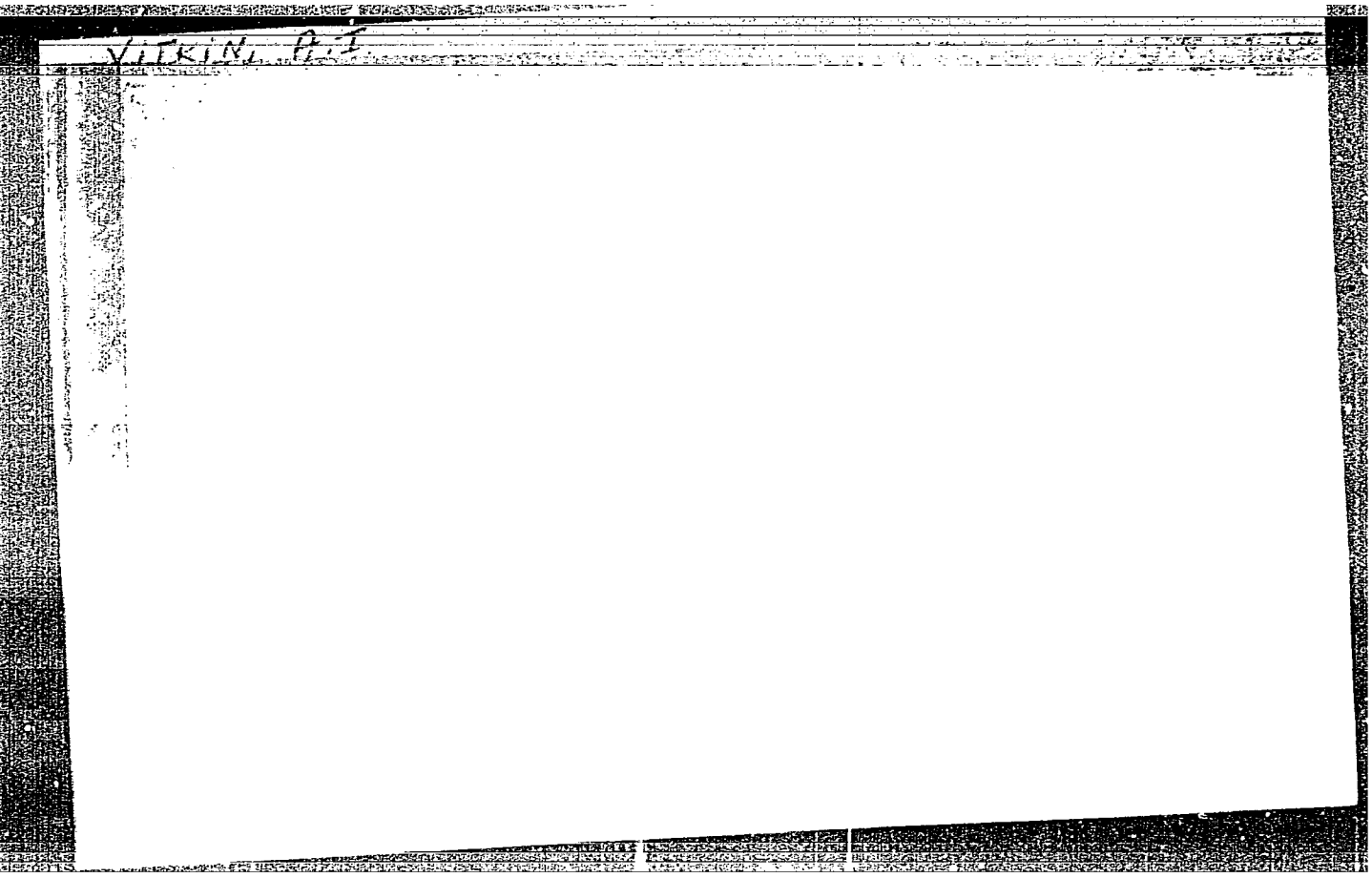


VITKIN, A.I. (Moskva)

Role of flux in hot tinning. Izv.AN SSSR.Otd.tekh.nauk no.5: 154-156 My '56. (MLRA 9:8)

(Tinning)





NISKIN, A.I. (Moskva); TUBYSHKINA, Z.A. (Moskva)

Mutual relationship between the thickness of the diffusion layer on tin, the temperature of stannic bath and the duration of tinning. Izv.AN SSSR.Otd.tekh.nauk. no.2:156-159 F '57. (MLRA 10:5)
(Tinning)

VITKIN, A.I.

Use of radioactive isotopes in studying the mechanism of basic processes in hot tin plating. Dokl. AN SSSR 115 no.4:710-713 Ag '57. (MIRA 10:12)

1. Predstavleno akademikom I.P. Bardinym.
(Tin plating)
(Radioisotopes--Industrial applications)

VITKIN, A. I.

20-4-21/60

AUTHOR: Vitkin, A. I.

TITLE: The Use of Radioactive Isotopes in Studying the Mechanism of the Basic Processes of Hot Tinplating (Primeneniye radioaktivnykh izotopov pri issledovanii mekhanizma osnovnykh protsessov goryachego luzheniya).

PERIODICAL: Doklady Akad.Nauk SSSR, 1957, Vol. 115, Nr 4, pp. 710-713 (USSR)

ABSTRACT: There does not yet exist a conclusive theory on the process of hot tinplating of sheet metal known since many centuries. Various reactions were suggested in different earlier works. The conceptions contained in these earlier papers are summarized in a sketch. In order to determine the true mechanism of the processes of hot tin-plating, the author attempts to follow the motion of the particles of tin and iron in the technological node of the flow by the method of labelled atoms. For this purpose radioactive tin isotopes or iron isotopes were, according to the problem to be solved, introduced into the liquid tank or into the flow. For determining the transition of tin from the tank into the flow, radioactive Sn^{121} was introduced into the tank. The sheet sample was then dipped into this flow. Then the specific activities of the flow If and of tin I_z were determined. From the I_f/I_z ratio the accumulation of tin in the flow may be concluded. The dissolution of iron in the flow and

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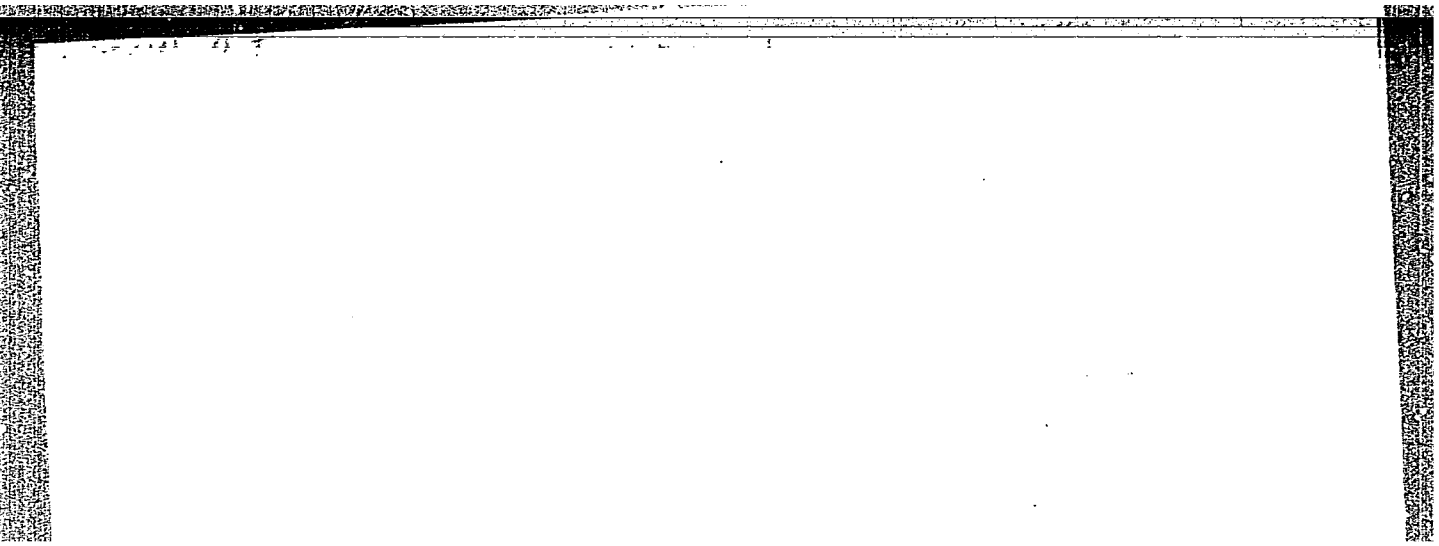
The Use of Radioactive Isotopes in Studying the Mechanism of the Basic Processes of Hot Tinplating.

its transition from the flow into the tank were determined in an analogous manner. For this purpose radioactive Fe^{59} was applied to the sheet sample. When a steel strip passes through the flow ($ZnCl_2$) into the tank, theiron dissolves in the flow and the flow is enriched with iron perchloride. On that occasion the tin of the liquid tank goes through dissolution over into the flow. Further details are given. The course of the processes in the node of flow can approximately be represented by a scheme given here. The processes of hot tin-plating may be explained in a similar manner.
There are 4 Figures and 8 references, 2 of which are Slavic.

PRESENTED: March 15, 1957, by I. P. Bardin, Academician

SUBMITTED: March 14, 1957

AVAILABLE: Library of Congress



APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001860120009-4"

The flux during thermal zinc plating ... Zn - Fe galvanic pairs

20-119-2-21/60

AUTHORS: Vitkin, A. I., Plotnikova, T. P., Kokorin, G. A.

TITLE: Investigation of the Structure and Phase Composition of Coatings in the Hot-Tinning of Sheet Iron (Izucheniye struktury i fazovogo sostava pokrytiya pri goryachem luzhenii zhesti)

PERIODICAL: Doklady Akademii Nauk SSSR, 1958, Vol 119, Nr 2, pp 268 - 270 (USSR)

ABSTRACT: The first stage of the here discussed investigations concerns the pattern of the basis of tin-plate. For this purpose the various samples of industrial sheet and band iron were dectinned. On the sample of the basis of sheet iron the fibrous parts are very much contorted. The certain order according to which the crystals are arranged at the boundary of a ferrite grain is worth noticing. The white sections of the above mentioned pattern have few pores and the dark ones have many pores. Finally the author discussed the electronographic method used for these investigation. Enclosed photo-

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Investigation of the Structure and Phase Composition of Coatings in the Hot-Tinning of Sheet Iron

graphs show 2 electrographs of the surface layer and of the main mass of the sublayer. The basis of the hot-tinned sheet consists of at least 2 phases. The surface layer of this basis consists of one phase with tetragonal crystal lattice, which speaks in favor of a solid solution of iron in β-tin. This surface layer is obviously very thin compared to the whole mass of the basis. The mass of the basis mainly consists of the compound $FeSn_2$ which crystallizes in the tetragonal system. Then the authors determined the boundaries of the diffusion of tin into iron beyond the transition boundary. For this purpose an about ~1μ thick layer of radioactive tin

(Sn^{113} and Sn^{123})

was electrolytically deposited on plain steel samples. Then the samples were exposed to a temperature of 250° for 48 hours in vacuum. The basis is formed during the heating of the samples. Then the samples were cooled, detinned and then

Investigation of the Structure and Phase Composition of Coatings in the Hot- Tinning of Sheet Iron

the basis was separated in a chloride solution of $SbCl_3$.

In all cases the surface layer of the steel sample situated below the separated basis still contained small amounts of radioactive tin. The electronographic analysis of the surface showed a cubic volume-centered lattice with faded diffraction lines. Some conclusions of these investigations are: the interlayer on the hot-tinned sheet consists of dark and light sections consisting of the same structural phase. They differ, however, by the density of the packing and by the formation of $FeSn_2$ crystals. The dark sections are obviously the main centers for the porosity of the coating. By means of the here used electronographic method of investigation the existence of atleast 2 structural phases of the basis was found. However, the existence of other phases richer in iron cannot be assumed. The electronographs taken here speak in favor of the fact that the main mass of the

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Investigation of the Structure and Phase Composition of Coatings in the Hot-Tinning of Sheet Iron

basis ($FeSn_2$) crystallizes in the tetragonal crystal system. There are 4 figures, 1 table and 13 references, 3 of which are Soviet.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute for Ferrous Metallurgy)

PRESENTED: August 8, 1957, by I. P. Bardin, Member, Academy of Sciences, USSR

SUBMITTED: August 5, 1957

Card 4/4

AUTHORS: Vitkin, A. I., Plotnikova, T. P. 307/20-120-3-42/67

TITLE: Electrolytic Deposition of Glossy Tin Precipitates on Sheet Iron From Electrolyte Melts (Elektroliticheskoye osazhdeniye blestyashchikh osadkov olova na zhesti iz elektrolitov-rasplavov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 3, pp.588-591 (USSR)

ABSTRACT: An old dream of researchers is represented by the production of specular coatings by immediate electrolysis without additional melting of the tin deposit. By this an expensive, complicated process could be avoided, which leads to the production of products below standard. The attempts using additions to the electrolyte solutions hitherto have not passed beyond the laboratory stage. The specular lustre of the coatings is not the only criterion of the quality of the coatings. The corrosion resistivity is, after all, the decisive factor. The authors investigated the electrochemical processes causing the deposition of tin on sheet iron in the systems Sn (salt melt) - Fe. They consisted of a liquid electrode - tin, a solid electrode - iron, (sheet) as well

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Electrolytic Deposition of Glossy Tin Precipitates on Sheet Iron From Electrolyte Melts

as of a melt of the zinc, tin and potassium chlorides, further of the chlorides of other metals in various proportions. It was made clear by the measurement of the electromotive forces of the said systems that tin is the most electronegative electrode, that is to say, the anode, which passes over to the salt melt, from which it is deposited on the sheet. Fig 2 shows an oscillograph in coordinates E-τ (taken by G. V. Rumyantseva) characterizing the deposition process, which comes to a standstill already after the first seconds of the effect of the galvanic pair Sn - Fe. The curve E - τ approaches the abscissa, it does, however, not merge into it for a considerable period. The study of this process leads to the introduction of external current sources for the acceleration of the deposition. At current densities of from 40 - 70 a/dm^2 the tin-deposition on sheet iron proceeded. Its velocity was increased five- to tenfold. The dependence of the thickness of the deposit h on the time τ followed the common rules of the electrolytic process. The tin deposited from the electrolyte melt was immediately melted at the surface at temperatures above the melting point of tin. The

Electrolytic Deposition of Glossy Tin Precipitates on Sheet Iron From Electrolyte Melts

composition of the electrolyte was precised, thus securing optimum results at the following composition (in per cent by weight): 1) $SnCl_2$ 80, $ZnCl_2$ 5, KCl 15; 2) $SnCl_2$ 80, $ZnCl_2$ 5; KF 15; 3) $SnCl_2$ 75, $ZnCl_2$ 5; NH_4Cl 5, KCl 15; 4) $SnCl_2$ 64, $ZnCl_2$, 4,5 KCl 27, $AlCl_3$ 4,5. These prescriptions will be subjected to further precising. There are 4 figures and 2 references, which are Soviet.

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii
(Central Scientific Research Institute of Ferrous Metallurgy)

PRESENTED: January 15, 1958, by I. P. Bardin, Member, Academy of Sciences, USSR

SOV/20-120-3-42/67

Electrolytic Deposition of Glossy Tin Precipitates on Sheet Iron From Electrolyte Melts

SUBMITTED: October 30, 1957

1. Tin--Electrodeposition 2. Electrolytes--Properties

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VITKIN, A.I.

Dissolving sheet iron in various fluxes. Zhur. prikl. khim. 31 no.10:1607-1609 O '58. (MIRA 12:1)
(Tin plating)

SOV/76-32-7-24/45

AUTHOR: Vitkin, A. I.

TITLE: The Electromotive Forces and the Electrode Potentials of Tin and Iron in Systems With Tin-Containing Flux Electrolytes (Elektrodvizhushchiye sily i elektrodnyye potentsialy olova i zheleza v sistemakh s olovosoderzhashchimi flyusami-elektrolitami)

PERIODICAL: Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 7, pp 1612 - 1617 (USSR)

ABSTRACT: It was already found that tin deposits on sheet iron in fluxes of solutions and melts containing tin chlorides; this is explained by the fact that the system Sn/flux/Fe represents a short-circuited galvanic element the direction and behaviour of which may be determined by corresponding measurements of the EMF and electrode potentials. For this purpose a special device was constructed which consists of an electrolytic cell, a shaft furnace with thermoregulation, a potentiometer, an oscillograph and the pertinent measuring instruments. The system consisted of a liquid electrode - tin, a solid electrode - iron (sheet iron) and a melt of tin and potassium chlorides as solvents (in connection with the position of Sn and Zn in the electrochemical series according to Yu.K.Delimarskiy (Ref 2),

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as well as of tin as an active component of the electrolyte. A number of systems were investigated always with liquid anodes, iron as cathode and melts with tin chlorides being used. It was found that in all systems Sn(melt)Fe tin from the electrolyte is deposited on the iron cathode. This fact of the deposition of a not noble metal on a more noble one has already been observed several times, e.g. by Raoult (Rault)(Ref 3), Tamman (Tamman)(Ref 4) and D.P.Zosimovich et al.(Ref 5); V.A.Plotnikov and D.P.Zosimovich (Ref 6) termed these elements "galvanic elements with alloy formation". In connection with the paper by D.P.Zosimovich and N.Ye.Nechayev (Ref 7) as well as with the oscillograms obtained it is found that the system investigated belongs to the above mentioned types of elements. In such an element the electrode potential difference will, in the presence of tin ions in the melt, remain at its maximum value only for some fractions of a second; on the other hand the cathode potential will become more negative by the rapid deposition of tin on the cathode, i.e. it will shift to the values of the anode potential. The tin deposited will immediately diffuse into the cathode surface in consequence of the high temperature

of the melt, and it will form an intermediate layer of the compound Fe - Sn. Due to this new phase structure a jump of the potential is found, so that the diagrams do not only characterize the electrochemical state but also the structural transformation at the cathode surface. The determination carried out in solutions showed phenomena analogous to those in flux melts, however, indicating a smaller velocity of the process. The experiments carried out with the system $Zn/ZnCl_2/Fe$ showed an analogy with the system Sn/flux/Fe, however, with the EMF in the beginning being considerably higher than that of the Sn-Fe element. There are 5 figures, 1 table, and 7 references, 5 of which are Soviet.

ASSOCIATION: Tsentral'nyy institut chernoy metallurgii, Moskva (Moscow, Central Institute of Iron Metallurgy)

SUBMITTED: March 15, 1957

The Electromotive Forces and the Electrode Potentials of Tin and Iron in Systems With Tin-Containing Flux Electrolytes SOV/76-32-7-24/45

1. Iron-tin systems--Electrochemistry 2. Electrolytes--Electrochemistry 3. Electrolytic cells--Performance 4. Electrodes--Materials 5. Electrodes --Electrochemistry

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VITKIN, A.I.

21(8) [illegible] I BOOK EXPLOITATION SOV/[illegible]

Vsesoyuznaya n[illegible] konferentsiya po pri[illegible] [illegible] izotopov i izlucheniy v [illegible] khozyaystva i nauke [illegible], 1957.

Trudy... Mashinostroyeniye i priborostroyeniye (Transactions of the All-Union Conference on the Use of Radioactive and Stable Isotopes and Radiation in the National Economy and Science; Machine and Instrument Manufacturing) Moscow, Izd-vo AN SSSR, 1958. 355 p. 4,500 copies printed.

Sponsoring Agencies: USSR. Glavnoye upravleniye po ispol'zovaniyu atomnoy energii, and Akademiya nauk SSSR.

Editorial Board of Set: V.I. Dikushin, Academician (Resp. Ed.), N.N. Shumilovskiy (Deputy Resp. Ed.), Yu. S. Zaslavskiy (Deputy Resp. Ed.), L.K. Tatochenko, B.I. Verkhovskiy, S.T. Nazarov, L.I. Petrenko, and N.O. Zelevinskaya (Secretary).

Ed. of Publishing House: P.M. Belyanin; Tech. Ed.: T.P. Poleneva.

PURPOSE: This book is intended for specialists in the field of machine and instrument manufacture who use radioactive isotopes in the study of materials and processes.

COVERAGE: This collection of papers covers a very wide field of the utilization of tracer methods in industrial research and control techniques. The topic of this volume is the use of radioisotopes in the machine-and instrument-manufacturing industry. The individual papers discuss the applications of radioisotope techniques in the study of metals and alloys, problems of friction and lubrication, metal cutting, engine performance, and defects in metals. Several papers are devoted to the use of radioisotopes in the automation of industrial processes, recording and measuring devices, quality control, flowmeters, level gauges, safety devices, radiation counters, etc. These papers represent contributions of various Soviet institutes and laboratories. They were published as Transactions of the All-Union Conference on the Use of Radioactive and Stable Isotopes and Radiation in the National Economy and Science, April 4-12, 1957. No personalities are mentioned. References are given at the end of most of the papers.

Chernyakova, R.B. Method for Estimating the Degree of Degreasing of Metals 108

Gulyayev, B.B., Yu.P. Borovskiy, L.N. Postnov, O.N. Magnitskiy. Study of the Processes of Cast Formation in Sand Molds 112

Vitkin, A.I. (Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii — Central Scientific Research Institute of Ferrous Metallurgy). Study of the Mechanism of the Basic Processes in Hot Tin Plating 119

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Segalin, Ya.G., and A.A. Rudanovskiy (Vsesoyuznyy ugol'nyy nauchno-issledovatel'skiy institut — All-Union Coal Research Institute). Use of Radioactive Isotopes in the Automation of Excavating and Drifting Machines 150

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VITKIN, A. I.: Doc Tech Sci (diss) -- "The mechanism of the basic processes of hot tin-plating of sheet iron". Moscow, 1958. 23 pp (Min Higher Educ USSR, Moscow Inst of Nonferrous Metals and Gold im M. I. Kalinin, Chair of Electrochemistry and Corrosion), 150 copies (KL, No 2, 1959, 120)

Vitkin, A. I.

25(1) PHASE I BOOK EXPLOITATION SOV/1878

Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Institut stali

Prokatnoye i truboprokatnoye proizvodstvo (Rolling and Tube Rolling) Moscow, Metallurgizdat, 1959. 268 p. (Series: Its: Sbornik trudov, vyp. 16) Errata slip inserted. 2,500 copies printed.

Sponsoring Agency: USSR. Gosudarstvennaya planovaya komissiya.

Ed.: B. P. Bakhtinov; Ed. of Publishing House: N. A. Valov; Tech. Ed.: A. I. Karasev.

PURPOSE: This collection of articles may be of interest to scientific workers, process engineers in rolling and tube-rolling plants, and students of metallurgical vtuzes.

COVERAGE: The articles describe work done at the laboratory for metal forming at the Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute of Ferrous Metallurgy). Some theoretical and practical problems of hot and cold rolling of simple and intricate

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shapes and tubes are considered. Many of the articles discuss results of scientific research carried out under actual operating conditions. K.K. Andratskiy, A.I. Filatova, V.S. Smirnov, P.T. Yemel'yanenko, A.I. Tselikov, N.D. Lomakin, V.Ya. Ostrenko, D.Ye. Rokhman, O.A. Plyatskovskiy, I.A. Fomichev, Yu.K. Fedorov, and V.N. Shashkov are mentioned as having contributed to this field. There are 37 references: 33 Soviet and 4 German.

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Chizhikov, Yu. M., Candidate of Technical Sciences. Lateral Deformation in Rolling and Forging of Large Sections 36
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Kabantsev, N. A. and I. G. Drozd, Engineers. Pressure of Work on Rolls and Torques in Rolling Alloy Steels on Blooming Mills 47
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Pavlov, Ig.M., Corresponding Member, Academy of Sciences, USSR, Doctor of Technical Sciences, and M. L. Zaytsev, Engineer. Method of Comparing Pass Designs as Related to Efficiency of Deformation 111

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Zaytsev, M. L., Engineer. Design of a Diamond Pass for a Diamond-square System 134

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Teterin, P. K., Candidate of Technical Sciences. Tangential Slipping and Friction Forces in Cross Rolling and Roll Piercing 162
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SOV/123-59-19-78310

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 19, p 72 (USSR)

AUTHOR: Vitkin, A.I.

TITLE: Single Stand Continuous Rolling Mill

PERIODICAL: Sb. tr. Tsentr. n.-i. in-ta chernoy metallurgii, 1959, Nr 16, pp 71-80

ABSTRACT: It is suggested to effect the process of continuous rolling on single stand rolling mills, the possibility of which has been proved by experiments. In developing the new process, one started from the assumption that, as a limiting case, the two approaching arcs of contact of the operating rollers (R) of the continuous line should merge into one arc of contact. Continuous rolling on a single stand was carried out on the two-high 250 mill, the operating driving R of which, with a diameter of 250 mm, were drawn apart and fulfilled the function of supporting drive R. A special adapter was placed between the supporting R; this adapter possesses two pairs of operating R, the first of which with a R diameter of 40 mm and the second of 60 mm. The supporting R for the second pair of operating R were 80 mm in diameter.

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M.G.N.

SEVERDENKO, V.P., akademik; PASECHNYY, S.A., kand.tekhn.nauk; VITKIN, A.I., kand.tekhn.nauk; SHUMNAYA, V.A., insh.

Using rough rolls for dressing tin plates. Mash.Bel. no.6:44-48 '59. (MIRA 13:6)

1. Akademiya nauk BSSR (for Severdenko).
(Rolling (Metalwork))

VITKIN, Aleksandr Isaakovich. Prinimali uchastiye: KADANER, L.I.; OLEFIR, F.F.; SKLIVANOV, A.D.. FOMIN, N.V., red.; OZERETSKAYA, A.L., red.izd-va; VAYNSHTEYN, Ye.B., tekhn.red.

[Manufacture of electrolitically tinned plate] Proizvodstvo elektroliticheski luzhenoi zhesti. Moskva, Gos.nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1959. 309 p. (MIRA 12:11)

(Tin plating) (Electroforming)

5(1)

AUTHOR: Vitkin, A. I.

SOV/20-124-5-41/62

TITLE: Combination of the Processes of Annealing and Hot Cladding Using Salt Melts (Sovmeshcheniye protsessov otzhiga i goryachego pokrytiya s pomoshch'yu solevykh rasplavov)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 5, pp 1105-1108 (USSR)

ABSTRACT: The author has previously proved that the melt used in hot cladding constitutes an electroyte (solution or melt) from which the metal of the bath is discharged on the surface of strip or plate of steel (Ref 1). It has also been proved that the melt should contain as an essential component a salt of the cladding metal. The higher the temperature of the melt the more intensive is the discharge. The melting point of the melt can be raised into the temperature range wherein recrystallization of the lowcarbon steel occurs by an addition of NaCl, KCl, $BaCl_2$, etc to the melt ($ZnCl_2$; $ZnCl_2$ + $SnCl_2$). In this case the melt is also an annealing medium. As is apparent from figure 2 and table 1 the micro-structure and the mechanical properties do not differ from those of a normally annealed

plate of steel. The author draws the following conclusions from the results: 1) It is possible, on principle, to combine the processes of annealing and cladding be means of salt melts. This is to be used mainly to galvanize strip steel (Fig 4). 2) The strip steel is extremely rapidly heated in the salt melt because the heat transfer and electric discharge are highly intensive. 3) The time required for the recrystallization of the low-carbon steel depends on the temperature of the melt; the increase of this temperature will reduce the time required. The temperature transition of thin steel strip into the recrystalling range and the maintaining of the strip at said temperature for 0.5-1 sec secures a good structure and high mechanical quality of the steel without any need of additionally keeping the strip in the melt. 4) A prolonged residence beyond the optimum values adversely affects the mechanical properties of the steel strip. There are 4 figures, 1 table, and 2 Soviet references.

Combination of the Processes of Annealing and Hot Cladding Using Salt Melts SOV/20-124-5-41/62

ASSOCIATION: Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (Central Scientific Research Institute for Ferrous Metallurgy)

PRESENTED: August 29, 1958, by I. P. Bardin, Academician

SUBMITTED: August 6, 1958

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PHASE I BOOK EXPLOITATION SOV/3307

25(1)

Vitkin, Aleksandr Isaakovich

Proizvodstvo elektroliticheski luzhenoy zhesti (Manufacture of Electrolytic Tin Plate), Moscow, Metallurgizdat, 1959. 309 p. Errata slip inserted. 2,150 copies printed.

Ed.: N.V. Fomin; Ed. of Publishing House: A.L. Ozeretskaya; Tech. Ed.: Ye. B. Vaynshteyn.

PURPOSE: This book is intended for technical personnel at metallurgical plants, machine-building plants, and design institutes, for scientific personnel at research and educational institutions, and for students of metallurgy.

COVERAGE: The book presents basic data on the properties of tin and its alloys, engineering and economic data on the development of the electrolytic tin-plating processes, and information on applications of this new type of tin plate. Theoretical and empirical data on electrolytic tinning and on corrosion are given. Methods of testing and determining the quality of tin plate are explained. Experience gained in the application of the new method

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is discussed, and currently employed flow sheets and equipment are described. Specialists in the field who cooperated in the writing of the book are L.I. Kadaner, F.F. Olefir, and A.D. Selivanov. The "Zaporozhstal'" Metallurgical Plant is said to employ the method described in the book. Soviet and non-Soviet references are given at the end of each chapter.

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VITKIN, A.I., kand.tekhn.nauk

Single-stand mill for continuous rolling. Sbor.trud.TSNIICHM no.16:71-80 '59. (MIRA 12:5)
(Rolling mills)

VITKIN, A.I.; PETROVA, Ye.S.; BEREZOVSKIY, V.V.

Greasing of cans in a high voltage field. Kons.i ov.prom. 15 no.7:26-27 Jl '60. (MIRA 13:6)

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii.

(Tin cans)

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SOV/130-60-1-13/22

AUTHOR: Vitkin, A. I.

TITLE: State of Modern Tin Production Technology

PERIODICAL: Metallurg, 1960, Nr 1, pp 27-30 (USSR)

ABSTRACT: The author reviews continuous annealing and tinning methods as practiced in the U.S., Great Britain, and Germany. In the last decade continuous annealing of tin coil in horizontal and tower-type lines has been finding wide application in the Soviet Union. The total annealing and cooling time per coil of strip has decreased from 40 hours to 80-140 seconds; heat treatment conditions have greatly improved and strip with uniform cross section and length is being produced. Heating time does not exceed 6 to 8 sec, strip movement is 10 to 12 m/sec. Maximum yearly output of such continuous line is 250,000 ton strip. The combination of degreasing and heat treatment into one operation simplifies the technological process.

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However, no adequate process for continuous hot-dip tinning has been developed, "Zaporozhstal'" Plant (zavod "Zaporozhstal'") and the West German Federal Republic being the only exceptions. But, the rate of the process is still very slow (movement of strip: 3 to 5 m/min) and the coating rather heavy (about 3 mu). The Central Scientific Research Institute of Ferrous Metallurgy (TsNIIChM) is working on various methods of high-speed tin coating. Tinning in a high voltage field and by electrolytic deposition in salt solutions are the most promising methods. Coating thickness may be regulated within 1.5 to 5.0 mu in salt solution electrolysis. Parameters of the process allow the strip to move at high speeds. The one-side coating is endowed with good corrosion resistance and high luster. Since 1954 the same institute has been investigating the production of black lacquered tin plate. The life of lacquered cans with fish and vegetable products was found to be only 12 to 24 months. The lack of a high-speed process for coating and drying

lacquer impedes the development of black lacquered tin plate. With coating spread by means of rolls and convection drying the maximum strip movement is 3 to 10 m/min. In this connection the Central Scientific Research Institute of Ferrous Metallurgy is studying high-speed coating by deposition in a high-voltage field and induction drying by high-frequency currents (see Fig. 4). Latest trends: thin steel strip covered by plastic. There is 1 table; and 4 figures.

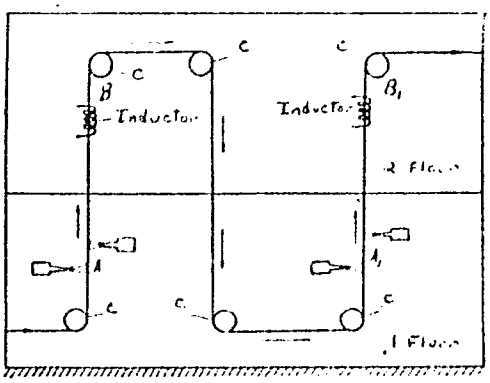

Fig. 4. Diagram of coating steel strip and drying the lacquer layer. A and A_1 are first and second coating in a high-voltage electric field (100-120 kv); B and B_1 are induction drying of the first and second layer respectively; C is rollers.

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AUTHORS: Vitkin, A.I., Kokorin, G.A.

TITLE: On the mechanism of bond between metal deposit and the metallic base

PERIODICAL: Fizika metallov i metallovedeniye, v.12, no.5, 1961, 782-784 + 1 plate

TEXT: The mechanism of bond development at the separation boundary of two solid metallic phases and the nature of bond developed between an electrolytically deposited metal layer and the metal base were studied by electron microscopic techniques. Special measures were observed during the tests in order to exclude the influence of temperature and oxidation of the base metal, since both these factors can affect substantially the processes occurring at the contacting surfaces. Tin or zinc deposits were formed electrolytically on 08кп (08KP) steel, zinc was deposited on copper plate specimens and tin was also deposited on chrome-plated steel specimens. Before electrolytic deposition of the test metals, the specimens were first electrolytically polished and washed in pure water through which a stream of hydrogen was passed during the

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On the mechanism of bond ...

washing. The specimens removed from the washing bath were then transferred to standard electrolytic baths maintained at 20°C. Layers, 5 to 10 μ thick, of the deposited metals were removed by electrochemical or chemical methods: tin deposit was removed by anodic etching in 10% HCl or by chemical treatment in a solution of meta-nitrobenzoic acid; zinc deposits were removed by treatment with 5% H_2SO_4. An intermetallic compound (γ-$Fe_{1.27}Sn$) was identified at the tin separation boundary with 08KP steel. The crystallographic constants of the compound are: $a = 4.22$ Å, $c = 5.20$ Å and $c/a = 1.23$. The intermediate layer consists of fine particles (100 to 200 Å) distributed over the whole of the specimen surface, and of relatively large particles (400 to 500 Å) concentrated along the block boundaries. After heating, γ-$Fe_{1.27}Sn$ originally present in the intermediate layer changes to $FeSn_2$. Intermetallic compounds of unknown composition were detected at the steel-zinc and copper-zinc separation boundaries. No Fe-Zn compounds were detected at the separation boundaries of the two metals. Thus, the formation of an intermediate phase consisting of an intermetallic compound or a solid solution appears

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to be responsible for the bond between electrolytical deposits and the metal base. It is suggested that under the conditions of electrolytic deposition at room temperature, the energetic conditions favour first of all the formation of non-equilibrium metastable phases, which when heated pass into more stable forms. There are 3 figures, 1 table and 12 references: 11 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: TsNIIChERMET

SUBMITTED: January 13, 1961

Card 3/3

KOKORIN, G.A., inzh.; VITKIN, A.I., doktor tekhn.nauk

Investigating the interconnection between the electrodeposited metal and base metal. Sbor. trud. TSNIICHM no.28:183-189 '62. (MIRA 15:11)

(Electroplating--Testing)

VITKIN, A.I.

(40)

PHASE I BOOK EXPLOITATION SOV/6044

Rokotyan, Ye. S., Doctor of Technical Sciences, Ed.

Prokatnoye proizvodstvo; spravochnik (Rolling Industry; Handbook) v. 2. Moscow, Metallurgizdat, 1962. 685 p. 8500 copies printed.

Authors: P. A. Aleksandrov, Doctor of Technical Sciences; V. P. Anisiforov, Candidate of Technical Sciences; V. I. Bayrakov, Candidate of Technical Sciences; M. V. Barbarich, Candidate of Technical Sciences; B. P. Bakhtinov, Candidate of Technical Sciences [deceased]; B. A. Bryukhanenko, Candidate of Economic Sciences; M. V. Vasil'chikov, Candidate of Technical Sciences; A. I. Vitkin, Doctor of Technical Sciences; S. P. Granovskiy, Candidate of Technical Sciences; P. I. Grudev, Candidate of Technical Sciences; I. V. Gunin, Engineer; M. Ya. Dzugutov, Candidate of Technical Sciences; V. G. Drozd, Candidate of Technical Sciences; N. F. Yermolayev, Engineer; G. M. Katsnel'son, Candidate of Technical Sciences; M. V. Kovynev, Engineer; M. Ye. Mugayenko, Engineer; N. V. Litovchenko, Candidate of Technical Sciences; Yu. M. Matveyev, Candidate of Technical

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